

IN THE DRAWINGS

The attached sheet of drawings includes changes to FIG. 1. This sheet, which includes FIGs. 1 and 2A, replaces the original sheet including FIGs. 1 and 2A.

Attachment: Replacement Sheet

REMARKS/ARGUMENTS

Favorable reconsideration of this application in view of the above amendment and following remarks is respectfully requested.

Claims 1-19 are pending. Claims 13, 16, and 17 are withdrawn. In the present amendment, Claims 1, 4, 6, 8-12, and 15 are currently amended, and new Claims 18 and 19 are added. Support for the present amendment can be found in the original specification, for example, at page 20, lines 18-31. Thus, it is respectfully submitted that no new matter is added.

In the outstanding Office Action, the drawings were objected to; the specification was objected to; Claims 1, 4, 8, 10, and 12 were objected to; Claims 1-3, 6, and 7 were rejected under 35 U.S.C. § 102(b) as anticipated by Jiwari et al. (U.S. Publication No. 2003/0025209, hereinafter “Jiwari”); Claims 1 and 6-8 were rejected under 35 U.S.C. § 102(b) as anticipated by Sugahara et al. (U.S. Patent No. 5,989,998, hereinafter “Sugahara”); Claims 4 and 5 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jiwari in view of Hongo et al. (U.S. Publication No. 2002/0046808, hereinafter “Hongo”); Claim 9 was rejected under 35 U.S.C. § 103(a) as unpatentable over Sugahara in view of Hongo; Claim 10 was rejected under 35 U.S.C. § 103(a) as unpatentable over Sugahara in view of Subrahmanyam et al. (U.S. Patent No. 6,107,192, hereinafter “Subrahmanyam”); Claim 11 was rejected under 35 U.S.C. § 103(a) as unpatentable over Sugahara in view of Subrahmanyam and Kao et al. (U.S. Publication No. 2001/0042513, hereinafter “Kao”); Claim 12 was rejected under 35 U.S.C. § 103(a) as unpatentable over Sugahara in view of Subrahmanyam and Kumar et al. (U.S. Publication No. 2003/0084587, hereinafter “Kumar”); and Claims 14 and 15 were rejected under 35 U.S.C. § 103(a) as unpatentable over Ito et al. (U.S. Publication No. 2003/0116854, hereinafter “Ito”) in view of Sugahara.

In response to the objection to the drawings, Fig. 1 is amended as suggested in the Office Action. It is respectfully submitted that no new matter is added. Accordingly, it is respectfully requested that the objection to the drawings be withdrawn.

In response to the objection to the specification, the title of the invention is amended as suggested by the Office Action. Further, a new Abstract in more proper form is hereby submitted as suggested by the Office Action. Accordingly, it is respectfully requested that the objection to the specification be withdrawn.

In response to the objection to Claims 1, 4, 8, 10, and 12, the claims are amended as suggested in the Office Action. It is respectfully submitted that no new matter is added. Accordingly, it is respectfully requested that the objection to Claims 1, 4, 8, 10, and 12 be withdrawn.

Turning now to the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a), Applicants respectfully request reconsideration of these rejections and traverse these rejections, as discussed below.

Amended Claim 1 recites, in part, “modifying said F-doped carbon film by nitrogen radicals.” It is respectfully submitted that the cited references do not disclose or suggest every feature recited in Claim 1.

Jiwari describes an inductively coupled plasma processing apparatus wherein a bottom electrode 11 is disposed on the bottom of a reactor chamber 10 and holds a semiconductor substrate 12 thereon. Jiwari further describes depositing a second fluorine-containing organic film and densifying the second fluorine-containing organic film by “exposing the second fluorine-containing organic film to plasma of a rare gas in the reactor chamber.”¹ However, Jiwari does not disclose or suggest “modifying said F-doped carbon film by nitrogen radicals,” as recited in amended Claim 1. Accordingly, it is respectfully

¹ See Jiwari, at paragraph [0020].

requested that the rejection of Claim 1, and all claims dependent thereon, as anticipated by Jiwari, be withdrawn.

Sugahara describes a method of forming an interlayer insulating film in a semiconductor device and problems associated with an organic SOG film exposed to an oxygen plasma. The Office Action asserts on page 6 in paragraph 9 that Sugahara discusses “modifying said F-doped carbon film by radicals” in col. 14, line 19. However, Sugahara does not disclose or suggest “modifying said F-doped carbon film by nitrogen radicals,” as recited in amended Claim 1. Accordingly, it is respectfully requested that the rejection of Claim 1, and all claims dependent thereon, as anticipated by Sugahara, be withdrawn.

Independent Claim 10 recites, in part, “modifying at least said sidewall surface of said opening by nitrogen radicals.” The Office Action on page 9 acknowledges that Sugahara does not disclose or suggest “a step of modifying at least said sidewall surface of said opening by radicals.” Instead, the Office Action asserts that Subrahmanyam cures the deficiencies of Sugahara. Subrahmanyam discusses precleaning a semiconductor surface by exposure to hydrogen radicals,² but does not disclose or suggest “modifying at least said sidewall surface of said opening by nitrogen radicals,” as recited in amended Claim 10. Accordingly, it is respectfully submitted that Claim 10 is patentable over Sugahara in view of Subrahmanyam.

With respect to the rejection of independent Claim 14, the Office Action on page 12 in paragraph 15 asserts that Ito discloses: 1) depositing a fluorine-doped carbon film 14 on a substrate 24 in paragraph [0048]; and 2) depositing a second metal (Al) film in paragraph [0082]. However, it is noted that the depositing the fluorine-doped carbon film 14 on a substrate 24 in paragraph [0048] corresponds to the first embodiment of Ito and the depositing a second metal (Al) film in paragraph [0082] corresponds to the third embodiment

² See Subrahmanyam, at col. 3, line 12.

of Ito. It is respectfully submitted that the first and third embodiments of Ito occur under different conditions. Specifically, as discussed in paragraph [0074 of Ito, the purpose of the third embodiment of Ito is forming a metal oxide layer, and thus, it is essential that the third embodiment uses an oxide material, which contains oxygen, for the formation of the low-K dielectric film. Thus, the third embodiment of Ito rules out the use of a “fluorine-doped carbon film,” which does not contain oxygen. Further, it is respectfully submitted that Sugahara does not cure the deficiencies of Ito. Accordingly, it is respectfully requested that the rejection of Claim 14, and Claim 15 which depends thereon, as unpatentable over Ito in view of Sugahara, be withdrawn.

New Claims 18 and 19 are added by the present amendment. Support for new Claims 18 and 19 can be found in the original specification, for example, at page 20, lines 18-31. Thus, it is respectfully submitted that no new matter is added. Further, it is noted that new Claims 18 and 19 depend on Claims 1 and 10, respectively. Thus, it is respectfully submitted that new Claims 18 and 19 are patentable for at least the reasons discussed above with respect to Claims 1 and 10. Accordingly, it is respectfully requested that new Claims 18 and 19 be allowed.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

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